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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/776.421

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Dingrong Yi

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ADAMS LAW OFFICE

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EXAMINER

SHAPIRO, LEONID

ART UNIT

PAPER NUMBER

2629

MAIL DATE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/776,421	Applicant(s) YI ET AL.	
	Examiner Leonid Shapiro	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 21, 22, 24-27, 51 and 57 is/are rejected.
- 7) ☒ Claim(s) 5-20, 23, 28-50 and 52-56 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5-10-04</u> | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 1-4,21-22,24-27,51,57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenberg et al. (5,576,727).

As to claim 1, Rosenberg et al. teaches an apparatus and software for manipulating real and virtual objects in three-dimensional space (col. 1, lines 9-12), comprising:

a mechanical armature (fig. 1), comprising:

a surface and a stylus movably connected to mechanical linkages and rotational joints so that the stylus and surface may have a location and orientation with six degrees-of-freedom (fig. 1, items 11-12,15,18, from col. 2, line 67 to col. 3, line 1);

a sensor at each rotational joint to determine the location and orientation of the mechanical linkages and rotational joints (fig. 1, items 13,16,19, col. 4, lines 16-31);

a force generator at each rotational joint to rotate the joint and move the mechanical linkage (fig. 1, items 13,16,19, col. 7, lines 8-20);

a computer for receiving, sending, and processing the location and orientation information from each sensor (fig. 1, items 32,34, col. 4, lines 16 to 31);

an output mode whereby the force generators change the location and

orientation of each rotational joint to correspond to a programmed location and orientation so that the armature provides a physical representation of a virtual object (fig. 1, items 13,16,19, col. 7, lines 8-20);

an input mode whereby an operator moves the stylus, the sensors provide the location and orientation of each rotational joint to the computer, and the computer displays a two-dimensional representation of the armature (fig. 1, items 13,16,19,32,34, from col. 2, line 66 to col. 3, line 15 and from col. 5, line 52 to col. 6, line 17).

Rosenberg et al. does not disclose a motor changing the location and orientation of each rotational joint to correspond to a programmed location and orientation so that the armature provides a physical representation of a virtual object.

It would have been obvious to one ordinary skill in the art at the time of the invention to replace the force generator with a motor to allow several degrees of freedom in the motion of stylus (col. 2, lines 3-7).

As to claim 2, Rosenberg et al. teaches weight balancing blocks, holding torque, and friction maintain the location and/or orientation of the stylus (col. 2, lines 3-11).

As to claim 3, Rosenberg et al. teaches the armature and software provides image-based co-registration algorithms that can be easily validated (col. 2, lines 3-11).

As to claims 21-22,25 Rosenberg et al. teaches mechanical armature has six degree-of-freedom surface manipulation and representation (fig. 1, col. 3, lines 43-46).

As to claims 4,24,26-27,57 Rosenberg et al. teaches the surface and stylus of the armature may be manipulated in three-dimensional space and the software provides

a two-dimensional image of a scan plane, which is useful for image navigation (from col. 1, line 60 to col.2, line 2).

As to claim 51, Rosenberg et al. teaches the operator manipulates the stylus or surface to a location and orientation, and software is used to evaluate the data from each sensor so that the location and orientation of the stylus or surface may be computed (figs 2A-2B, items 13,16,19, from col. 4, line 56 to col. 5, line 14).

Allowable Subject Matter

2. Claims 5-20,23,28-50,52-56 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Relative to claim 5 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that surface manipulation in three-dimensional space can be used for image navigation based on spatial information from a 4 x 4 matrix contained in a header file of each image.

Claim 56 depends on claim 5.

Relative to claim 6 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that surface and stylus manipulation, and image navigation can be used for automatic manipulation of a medical device to a given location indicated by three spatial coordinates.

Claims 7-12,28 depend on claim 6.

Relative to claim 13 the major difference between the teaching of the prior art of

record (Rosenberg et al.) and the instant invention is that armature and software provides for control of a scan plane in magnetic resonance imaging.

Claims 14-20,40-41 depend on claim 13.

Relative to claim 13 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that mechanical armature can generate a physical representation of a two-dimensional scan plane of a magnetic resonance image relative to an object in real patient coordinates.

Relative to claim 29 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that armature device can be used for the automatic manipulation of a medical device to a given position indicated by three spatial coordinates.

Claims 30-31,36-38 depend on claim 29.

Relative to claim 32 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that said armature and software system provide images for interventional magnetic resonance imaging applications.

Claims 33,39 depend on claim 32.

Relative to claim 34 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that armature and software system provides integration of input and output functionality of the armature to achieve visualization and navigation of the catheter tip towards the target in an intuitive and efficient way.

Claims 35 depends on claim 34.

Relative to claim 42 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that software provides graphical visual information about the object being imaged, the projected display of the 2-dimensional scan plane, and the expected magnetic resonance image corresponding to that scan plane of the tissue being imaged.

Claims 43 depends on claim 42.

Relative to claim 44 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that algorithm can be used to rotate shaft of said motor to enable reaching the destination based on the angular position of the destination and current position of said motor, thereby eliminating the need for an expensive multi-degree motor controller.

Relative to claim 45 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that a base removably mounted on a surface; a first linkage connected to the base through a first rotational joint so that the first linkage is parallel to the surface and can rotate on an axis parallel to the surface; a second linkage connected to the first linkage through a second rotational joint so that the second linkage can rotate on an axis perpendicular to the first linkage; a third linkage connected to the second linkage; a fourth linkage connected to the third linkage through a through a third rotational joint so that the fourth linkage can rotate on an axis perpendicular to the third linkage; a fifth half-circle linkage connected to the fourth linkage through a fourth rotational joint; a sixth linkage connected to the fifth linkage through fifth rotational joint and an end so that sixth linkage can rotate;

a surface connected to the sixth linkage through a sixth rotational joint so that the surface can rotate.

Claims 47-55 depend on claim 32.

Relative to claim 46 the major difference between the teaching of the prior art of record (Rosenberg et al.) and the instant invention is that mechanical armature contains six or more mechanical linkages and six or more rotational joints.

Telephone Inquire

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Shapiro whose telephone number is 571-272-7683. The examiner can normally be reached on 8 a.m. to 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe can be reached on 571-272-7691. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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COMMUNICATIONS SECTION
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